Ethics debate overdue in human brain research: experts

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What if human brain tissue implanted into a pig transferred some of the donor's self-awareness and memories?

Such a scenario, out of reach for now, is becoming more and more conceivable, according to a group of scientists, ethicists, and philosophers who called Wednesday for a debate on the ethics of storing and using human brain matter.

Brain "surrogates" composed of real human cells—whether in tiny organoids grown in the lab, in grey matter removed from a human patient, or brain tissue implanted into animals—are crucial for studying the organ that allows us to think.

But there are risks, 17 experts warned in a comment published in the science journal *Nature*.

"As brain surrogates become larger and more sophisticated, the possibility of them having capabilities akin to human sentience might become less remote," they wrote.

"Such capacities could include being able to feel (to some degree) pleasure, pain or distress; being able to store and retrieve memories; or perhaps even having some perception of agency or awareness of self."

There is a need, the group argued, for "clear guidelines for research", and for special oversight committees.

They pointed to a study in which scientists noted "neural activity" after shining light on a region of a human "organoid" with eye and brain cells.

Organoids are rudimentary, 3-D structures grown from human stem cells and used to mimic features of a developing organ to study disease and disability.

The authors pointed to another study in which tiny, human brain organoids—implanted into the brains of mice—survived and communicated with the host brain.

"Without knowing more about what consciousness is, and what building blocks it requires, it might be hard to know what signals to look for" in experiments, the letter states.

One solution, it proposed, could be for researchers to use anaesthesia to keep animals with human brain tissue in a comatose state.

"Perhaps certain brain functions or a pre-specified level of brain activity, signalling a lack of capacity, could be used to delineate ethically justifiable research."

Such difficult questions should not halt critical research, the team underlined.

Brain surrogates can help unlock the mysteries of psychiatric and neurological illnesses.

"But to ensure the success and social acceptance of this research long term, an ethical framework must be forged now, while brain surrogates remain in the early stages of development."

More information: Debate ethics of growing or sustaining human brain tissue outside the body, *Nature* (2018). nature.com/articles/doi:10.1038/d41586-018-04813-x